

Q & A

A Conversation on Fat Pad Atrophy & Regenerative Treatment With
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Liposana® Adipose Allograft: Restoring Cushioning for Foot Pain Relief

What are your thoughts about fat pad atrophy of the foot?

Fat pad atrophy is far **more common** than we realize. Just think about it. Patients have been coming to podiatrists for treatment of **painful calluses** and **chronic heel pain** since the time the profession started. These conditions have been treated with conservative care, medications, orthotics, and surgery.

The problem is that when **atrophy of the fat pad** is present, there are other diagnostic factors present, meaning the **diminution of the protective adipose cushioning** is oftentimes the **third diagnosis** and is therefore often **overlooked**.

*In fairness, until recently there hasn't been a **practical option** to treat **fat pad atrophy**. So, it's been overlooked as a **diagnosis**. Documentation has been focused on **what's being treated, not the underlying condition**.*

I also believe localized **steroid injections** given to provide anti-inflammatory relief lead to **steroid-induced fat pad atrophy** more often than we realize.

Let's face the facts – podiatric and allopathic medicine have been **reactive in practice; treating symptoms** and control their sequelae. **Regenerative medicine** is only just being realized as an **essential form of therapy**, and physicians are trying to catch up.

How does diagnosing fat pad atrophy impact the treatment of chronic metatarsalgia and heel pain?

Diagnosing and **treating fat pad atrophy** gives patients **more than temporary relief**. It offers the ability to **return to everyday living**...walking their dog, going to the market, and participating in family functions. They **no longer have to sit on**

the sidelines. The impact is meaningful. Treating fat pad atrophy has the potential to **significantly improve quality of life and overall health.**

When the **fat pad diminishes**, so does its cushioning qualities. It does not have the capability to regenerate on its own as the degenerative activity usually **outpaces the regenerative activity.** Over time, there is a **risk of foot ulcers** and their inherent complications.

New technology is now available to address the **challenges associated with fat pad atrophy**, which has up until now had limited treatment options.

How are you treating fat pad atrophy?

I'm using **Liposana.** It is a **human allograft adipose tissue transplant.** It works by initiating the **lipo-regenerative process** to **reverse degenerative lipo-regression**, allowing your body to **restore** natural adipose tissue and **alleviating symptoms.**

It's a **minimally invasive treatment** that's administered **by injection.** The treatment is performed in the office **under local anesthesia.**

What are key characteristics of Liposana?

Liposana is unique in that it **retains the structural integrity and function** of native adipose tissue. It has been **processed** to eliminate immunogenic components, making it suitable for use in patients with **adipose tissue insufficiency and defects.** In simpler terms, **Liposana closely mimics natural fat tissue.**

Why use Liposana allograft instead of autologous fat?

Autologous fat transplants can yield good results, but these **results** are often inconsistent. The procedure also requires an additional step to harvest the adipose tissue, **increasing surgical risks** and the potential for complications at the donor site. Furthermore, the transplanted adipose **tissue can be resorbed** by the recipient's body due to variations in harvesting and processing techniques, as well as the individual's health.

Liposana reduces the risk of post-injection transplant complications by eliminating the need for an additional surgical procedure. The allograft also undergoes a **rigorous validated process** that ensures its **consistency.**

What is the advantage of using Liposana vs. fresh adipose tissue?

Liposana is processed to remove pro-inflammatory cytokines, so it does not elicit immune activity. **Fresh adipose tissue**, on the other hand, **contains high levels of these pro-inflammatory cytokines**. The presence of these substances in adipose tissue-derived products **may negatively affect clinical outcomes**.¹

What happens to the allograft, Liposana, after implantation?

After implantation, Liposana integrates and remodels within the host tissue, **rather than being resorbed**. After the implantation, Liposana is populated by a **significant number of a patient's M2 macrophages**, which are known for their **anti-inflammatory and pro-angiogenic properties**. This **promotes the formation of new blood vessels**, a process that can be observed as early as day 3 post-implantation.^{2,3}

Why are M2 macrophages clinically important?

The early presence of **M2 macrophages** in fat grafts **supports blood vessel formation, attracts native stem cells**, and helps the graft **maintain its volume and structural components without resorption**. These properties **contribute to the long-term stability and effectiveness** of the allograft, which can be detected through direct and gentle palpation.

Why is Liposana a preferred choice for a lipo-regenerative adipose allograft?

Earlier allografts were composed of **only adipose extracellular matrix**, which **does not provide cushioning**. I believe **Liposana is superior** because, as a **human cryopreserved adipose tissue allograft**, it retains both the **extracellular matrix and adipocytes**. This provides both **structural support and cushioning**.

Why are adipocytes important?

Adipocytes are not simply passive fat storage units. They are **metabolically active cells** that secrete a variety of **growth factors and cytokines, collectively known as adipokines**. These molecules play **crucial roles in various physiological processes, including metabolism, inflammation, and tissue repair**.⁴

What is the role of cryopreserved human allograft tissues in the regenerative process, and how does it provide cushioning with the extracellular matrix?

Liposana is **specifically designed to repair adipose tissue defects**. It contributes to the regenerative process in several ways:

- **Extracellular Matrix Scaffold:** The extracellular matrix provides a **structural framework** that supports **cellular organization and tissue integrity**. This creates a favorable environment for native cell infiltration and tissue remodeling. This is crucial in **restoring cushioning** as the allograft contributes to the tissue's mechanical capabilities to **absorb shock** and **distribute forces** that occur during repetitive stress activities or trauma.
- **Promotion of Tissue Regeneration:** The extracellular matrix also contains **bioactive molecules**, such as **growth factors and cytokines**, which **stimulate host cell migration, proliferation, and differentiation**. The components within the extracellular matrix can **trigger regenerative responses** in the surrounding host tissues. This includes **angiogenesis**, which is **vital for the regenerative process**.
- **Structural Support and Volume Restoration:** **Adipocytes** present in the cryopreserved allografts **provide volume and structural support** to **damaged or deficient tissues**. This is particularly important in applications **where cushioning is needed**, such as restoring fat pads inferior to **weight-bearing areas** like the metatarsal heads or the calcaneus.

How do you determine which patients could benefit from Liposana?

Liposana is indicated for patients who have a **callus or heel pain** that has **not responded to traditional treatments** because they also have **fat pad atrophy**. It is an option for patients who want to **avoid surgery** or are not good surgical candidates.

I believe patients with **Baxter's Neuritis, Tarsal Tunnel Syndrome, prominent metatarsal heads, chronic Metatarsalgia, recurrent Plantar Keratosis, pre-ulcerative sites, Intractable Sesamoiditis, and plantar ulcers** may all be considered candidates for this **lipo-regenerative treatment**.

What's involved in creating a treatment plan for Liposana?

You first need to **determine the volume** of Liposana needed for the specific area and then **identify where to administer** it.

For example, the middle **metatarsal heads** generally take **3cc's of allograft**. Care must be taken to **evaluate the entire area**, and **graduated amounts** are needed to provide **adequate cushioning** under the most **prominent painful area**. It's also important to **provide protection for the adjacent areas** by the delivery of lipo-regenerative tissue to those areas as well. However, an **isolated fifth metatarsal head** might only need **1.5cc**.

In the **heel, 3cc's are often needed**. The **first deposit** of allograft material is **in the area identified as the most painful**. It is injected through a **blunt 18-gauge, 1.5-inch needle** during **needle withdrawal**. The process is **repeated** multiple times **until the area of atrophy is addressed** and **clinical cushioning is evident**.

Each **area of dysfunction** needs to be **independently evaluated** as lipo-regenerative therapy is **not one-size-fits-all**.

Do you have any insider tips for administering Liposana?

I do. My technique has evolved over the years. It's **improved** and makes it **easier to administer** and **better for my patients**.

Here are the steps:

1. **Inject a regional block well proximal** to the area of atrophy. This way the **anesthetic does not distort** the area of dysfunction.
2. **Puncture the dermal entry point** with a **14 or 16-gauge needle** just down to the **subdermal layer**. This offers **better control, precise placement**, and is easily **stabilized with steri-strips**.
3. Use a **blunt needle, 18-gauge and 1.5-inch long**, attached to a **5cc syringe containing the allograft**. Insert into the **puncture site** and then **gently manipulate** the blunt needle to **traverse the area of atrophy**. The **blunt needle allows for separation of tissue** rather than cutting tissue. This greatly **reduces trauma and nerve injury**. The key is to **be gentle**.

4. **Inject the allograft upon withdrawal.** Repeat by **repositioning the blunt needle** and **injecting upon withdrawal** until the area of **fat pad atrophy** has been **covered with the allograft**.
5. **Steri-strips stabilize** the incision. Advise the patient to **keep dry for 2 days**.
6. When injecting the **forefoot**, suggest the patient **walk with their foot externally rotated** to help **partially offload** the forefoot.
7. When injecting the **heel**, a **silicone heel pad** is helpful to **cushion the area** while the **allograft restoration** and **incorporation** take place.

Post-treatment Advice:

1. **Attenuate activities** after the treatment and **respect the gift of pain**. If it hurts, **stop** those activities that cause **discomfort or pain**.
2. Wear **soft cushioned shoes** for several weeks.
3. **Avoid repetitive and high impact activities.**
4. **Tylenol** is okay for pain. **Avoid NSAIDs. NO ICE. NO HEAT.**
5. **Topical 4% Lidocaine pain patches** (Salonpas) are helpful.
6. Be aware, patients **may have pain for several days to a few weeks**. I have **not found a correlation** between **weight, age, or severity of atrophy**. Each patient **responds differently**.
7. The **healing process** may take **6 to 8 weeks or more**; patients should be advised **it's a regenerative process that takes time**.

What is your experience with Liposana outcomes: How quickly does it work? What is the duration of the effect?

My experience, or more specifically **my patient's experience, is positive**. They generally start to **notice improvement** around the **fourth week**. Progress continues, and they **feel better around the eighth week**. By the **twelfth week, they are really pleased**. It takes time for new adipose tissue to organize and mature. It's about **long-term results**.

Note: **Controlling etiologic factors** such as biomechanical imbalances or attenuating **aggressive, high impact, and repetitive stress activities** are all **helpful in preventing recurrence**.

What can you say about adverse reactions to Liposana?

I have **not had any adverse reactions**.

Have you had any unusual requests to treat conditions that you hadn't thought about but are considering?

Yes. Living in Arizona means patients wear **sandals and flip-flops**, and I was questioned if Liposana could be used to **reduce wrinkles on the top of their feet**. My response was positive. With a very **direct and transparent discussion** with the patient that this would be a **cosmetic application, I would consider** it.

What kind of patients are not good candidates?

I would **not institute treatment** if **uncontrolled medical comorbidities** were present, such as: **Diabetes, Dyslipidemias, Peripheral Arterial Insufficiency with Claudication**.

I would **postpone treatment** for patients who were given **cortisone injections** in the area of atrophy – **12 weeks after one injection, 16 weeks if multiple** cortisone injections were given.

How has Liposana changed the way you treat patients?

This **innovative procedure offers new hope** for my patients. It provides a **safer and more effective solution** compared to palliative options that just give temporary relief or surgery that is far more invasive. **Liposana offers a natural way to restore the cushioning and provide shock absorbing protection** to vulnerable structures – neural, osseous, and tendinous on the plantar aspect of the foot. It's a **truly remarkable advancement** in the way we treat fat pad atrophy.

Sources:

¹Cavallo C, et al. Adipose Tissue-Derived Products May Present Inflammatory Properties That Affect Chondrocytes and Synoviocytes from Patients with Knee Osteoarthritis. *Int J Mol Sci.* 2023, 24(15):12401.

²Badylak SF, Gilbert TW. Immune response to biologic scaffold materials. *Semin Immunol.* 2008; 20(2):109-116.

³Anderson CF, Mosser DM. A novel phenotype for an activated macrophage: the type 2 activated macrophage. *J Leukoc Biol.* 2002; 72(1):101-106.

⁴Richard AJ, et al. Adipose Tissue: Physiology to Metabolic Dysfunction. PMID: 32255578.